

Cook and Chill: To what extent do US consumers use refrigerator and freezer thermometers in their homes?

Conclusion

Moderate, consistent evidence shows that US consumers lack refrigerator and freezer thermometers in their homes.

Grade: Moderate

Overall strength of the available supporting evidence: Strong; Moderate; Limited; Expert Opinion Only; Grade not assignable For additional information regarding how to interpret grades, [click here](#)

Evidence Summary Overview

A total of two cross-sectional studies, both receiving Ø quality ratings, were reviewed regarding the extent to which US consumers use refrigerator and freezer thermometers in their homes.

The two cross-sectional studies found that subjects reported a lack of thermometers in refrigerators and/or freezers in their homes (Kosa et al, 2007; Towns et al, 2006). Towns et al, (2006) concluded that their well-educated survey participants failed to follow proper refrigeration and freezer storage practices, in spite of being aware of the importance of doing so to prevent food-borne illness. Kosa et al, (2007) reported that only 10.7% of all respondents had a thermometer in their refrigerator prior to the survey. However, after receiving the refrigerator thermometer as part of the survey, 72% of all respondents reported that they refrigerators were at the recommended temperature (Kosa et al, 2007).



Evidence Summary Paragraphs

Kosa et al, 2007, in a neutral quality cross-sectional study, surveyed a nationally representative sample of 2,060 adults in the US (249 pregnant women, 946 older adults and 865 from the remaining population) to collect data on refrigerator thermometer ownership, home refrigerator temperatures and the frequency of cleaning for home refrigerators. The demographic characteristics of consumers following government-recommended refrigerator practices were also assessed, in terms of gender, age, educational background, marital status, household size, race or ethnicity, household income, metropolitan status and whether or not a member of the household had been diagnosed with diabetes, kidney disease or another condition that weakens the immune system. Only 10.7% of all respondents had a thermometer in their refrigerator prior to the survey. After receiving the refrigerator thermometer as part of the survey, 72% of all respondents reported that they refrigerators were at the recommended temperature.

Towns et al, 2006 in a neutral quality cross-sectional study, involving a random sample of 81 consumers from households in Peoria County, examined attitudes and practices related to proper refrigeration and storage techniques and determined whether demographic factors have an effect on those variables. Survey analyzed five demographic, 10 food storage and sanitation practice and 11 attitudinal questions concerning proper refrigeration and freezer food storage techniques. Subjects were concerned about and could identify proper refrigeration and freezer storage practices for preventing food-borne illness, but proper food storage techniques were not typically practiced in their homes, especially in use of refrigerator/freezer thermometers and storage of hot leftover food (e.g., 75.3% did not have a thermometer in refrigerator and 87.7% did not have same in freezer). Overall, only 30.9% received a total score greater than 6.0 for the 10 refrigeration/freezer storage practice questions. One-way ANOVA found no significant differences between total mean scores of self-reported practices with the independent variables of gender, age, education level and income.

 [View table in new window](#)

Author, Year, Study Design, Class, Rating	Population/Sample Description and Location	Design/Variables	Results/Behavioral Outcomes/Significance	Limitations
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<p>Kosa et al, 2007</p> <p>Study Design: Cross-sectional study</p> <p>Class: D</p> <p>Rating: </p>	<p>N= 2,060 nationally representative sample adults in the US (249 pregnant women, 946 older adults and 865 from the remaining population).</p>	<p>Data collected on refrigerator thermometer ownership, home refrigerator temperatures and the frequency of cleaning for home refrigerators.</p> <p>The demographic characteristics of consumers following government-recommended refrigerator practices were also assessed, in terms of gender, age, educational background, marital status, household size, race or ethnicity, household income, metropolitan status and whether or not a member of the household had been diagnosed with diabetes, kidney disease or another condition that weakens the immune system.</p>	<p>About half (47.4%) of all respondents had cleaned their refrigerators at least one month prior to the survey.</p> <p>Only 10.7% of all respondents had a thermometer in their refrigerator prior to the survey.</p> <p>After receiving the refrigerator thermometer as part of the survey, 72% of all respondents reported that they refrigerators were at the recommended temperature.</p>	<p>Not all respondents completed all questionnaire information.</p> <p>Relatively small sample size of pregnant women.</p> <p>Self-reported practice may not reflect actual practice.</p>
<p>Towns RE, Cullen RW et al, 2006</p> <p>Study Design: Cross-sectional study</p> <p>Class: D</p> <p>Rating: </p>	<p>N=81 randomly selected sample of consumers.</p> <p>Age: (percent of sample; years of age):</p> <ul style="list-style-type: none"> • 7.4%, 18-29 • 17.3%, 30-39 • 29.6%, 40-49 • 22.2%, 50-59 • 12.3%, 60-69 • 11.1%, >70. <p>Gender: 69.1% female, 30.9% male.</p> <p>Education:</p> <ul style="list-style-type: none"> • 8.2% graduate school or higher • 40.7% college diploma • 14.8% high school diploma. <p>Income:</p>	<p>Design</p> <p>Random sample survey conducted to examine attitudes and practices related to proper refrigeration and storage techniques of consumers in Peoria County, Illinois and determine whether demographic factors have an effect on those variables.</p> <p>Survey consisted of five demographic questions, 12 food storage and sanitation practice questions and 11 attitudinal questions concerning knowledge of and attitudes toward proper refrigeration and freezer food storage techniques (but only 10 practice and 11 attitudinal questions were used in the analyses).</p>	<p>One-way ANOVA found NS differences between total mean scores of self-reported practices with the independent variables of gender, age, education level and income.</p> <p>Findings related to refrigeration (refrig) and freezer consumer practices:</p> <p>75.3% did not have a thermometer in refrig.</p> <p>87.7% did not have same in freezer.</p> <p>80.2% thawed frozen meat in refrig and 55.6% correctly stored it near bottom shelf of refrig.</p> <p>63.0% wrapped up and</p>	<p>Results based on self-reported data that could introduce bias</p> <p>Low response rate (16.3%)</p> <p>Observation that majority of respondents (91.4%) reported a total household income >\$60,000(although this demographic finding appears incorrect) limits generalizability of study results.</p>

- 91.4% had self-reported total household income >\$60,000 (note that figure in study appears to be incorrect)
- 11.1%, \$45,000-\$59,000
- 8.6%, \$35,000-\$44,999
- 14.8%, \$20,000-\$34,999
- 8.6% <\$20,000.

48.1% stored hot leftover food in refrig when meal was completed.

100.0% reported wrapping or covering food before placing it in refrig.

51.9% incorrectly cooled hot leftover food to room temperature (RT) on counter before storing in freezer.

98.8% did not store hot leftover food at RT overnight.

95.0% correctly reported storing cooked foods near the top or middle shelves of refrig.

51.9% incorrectly let hot leftover soup cool to RT before placing in refrig, but 80.2% correctly put it into smaller containers first.

16.0% correctly stored raw eggs near bottom shelf of refrig and 38.3% stored raw eggs near middle shelf of refrig.


30.9% received a total score >6.0 for the 10 practice questions (69.1% received a total score of <6.0 for those 10 questions).

Although subjects were concerned about and could identify proper refrigeration and freezer storage practices for preventing food-borne illness, proper refrigeration and freezer food storage techniques were not typically practiced in their homes.

Research Design and Implementation Rating Summary

For a summary of the Research Design and Implementation Rating results, [click here](#).

Worksheets

 [Kosa KM, Cates SC, Karns S, Godwin SL, Chambers D. Consumer home refrigeration practices: Results of a web-based survey. *J Food Prot.* 2007 Jul; 70 \(7\): 1,640-1,649.](#)

 [Towns RE, Cullen RW, Memken JA, Nnakwe NE. Food safety-related refrigeration and freezer practices and attitudes of consumers in Peoria and surrounding counties. *J Food Prot.* 2006; 69: 1,640-1,645.](#)